"As It Was in the Beginning"

A Personal Narrative of the Early Days of Wireless by One of the Few Men Who were Helping Start the Wheels Almost Before There Were the Necessary Tracks

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I AM going to try to tell the story of how radio began in the United States. It will not be the story of who invented radio. That question of who invented radio is a subject that people quarrel over. While I am not a Quaker, my ancestors in Maryland may have been Quakers two hundred or more years ago, and I may have a "hang over" from them that makes me desire to avoid quarrels. At any rate I am not going to claim that I or any body else invented anything, but just try to tell how and when regular everyday wireless service started in the United States. I will call it "Wireless" because that is the name it went by in those days. And I am going to tell the story in a personal style because, in many ways, it is a personal story.

I suppose the reader wants to know just why I should write about this. Perhaps I shouldn't, but the reason I am writing about it is that I designed and supervised the construction of the instruments and stations that gave the first regular ordinary everyday radio service in our United States.

The next questions are: How did I happen to do that and what circumstances led up to it? When I entered Ohio State University in 1897, I had decided that I wanted to specialize in physics, especially on "cold light," "X-ray," or "Wireless." The head professor of physics, Dr. Thomas, was just recovering, after several months, from being burned by X-rays, which was discouraging for "X-rays," and he told me he did not think "cold light" was a field that we could do much with, so I decided on "wireless."

Dr. Thomas, was a scientist and he tried to see that I applied myself correctly to the study of what had been written and to the performance of the experiments, which had led up to wireless as it was then. Gradually this worked up to a point where I had quite a collection of wireless apparatus that I experimented with or, one might frankly, say "played with." As no other student was sufficiently impressed by wireless to work with me, I had to control both the transmitters and receivers by myself, therefore the longer distance work about the campus was accomplished by fixing a clock pendulum so

Pioneers Three

Are Mr. Marriott, Mr. G. W. Pickard, and Dr. De Forest in radio. They are some of the few who started in the field who are still active, twenty-four years after. Here is a well-told story of personal experience in the days when the infant radio daily astounded the natives, of whom, most scoffed and few believed. It's a good story.—THE EDITOR

it would touch a pool of mercury closing a circuit and making the transmitter send a dot every second.

THE EARLIEST RADIO COMPANY

IN 1901, articles appeared in newspapers stating that a corporation called the American Wireless Telephone and Telegraph Company was starting into wireless on a commercial scale. That company based its right to exist on a wireless patent issued to Professor Dolbear in 1886. I wrote the company asking for a job. Much to my surprise, the president of the company wrote back and told me I could have a job if I would take it at once. I hadn't quite finished my college course but I took the job, in June, 1901.

We of the American Wireless Telephone and Telegraph Co., built stations at Galilee, Briele and Barnegat, New Jersey, and placed a station on a vessel to report the yacht races of the *Columbia* and *Shamrock* in the fall of 1901.

Three organizations tried to report those yacht races, Marconi representatives from England, De Forest who was starting a wireless company in New Jersey, and our company, the American Wireless Telephone and Telegraph Company. Mr. Greenleaf Whittier Pickard was also with the American Company. I believe that Dr. De Forest, Mr. Pickard, and I are the only Americans who have continued actively in wireless up to the present. The others, who are living, have entered other lines of work or have retired.

Except for the brief service rendered in reporting the yacht races, those stations only served for demonstrating and experimenting as other stations had done before. They were

RADIO PIONEERS TWENTY-FOUR YEARS AGO

The men who built the wireless apparatus during the winter of 1901 and 1902 in the shop of the Carstarphen Electric Co., Denver, Colorado. Mr. W. P. Carstarphen is the tall bald man in the rear. Mr. G. T. Swenson who later became Mr. Marriott's assistant in the California work is the man in the checked shirt in the center. Mr. Marriott is at the left with his hand in his pocket. He says he was trying to raise a beard to look old enough for his job. He was twenty-two

RECEIVING APPARATUS, MODEL 1902

The coherer detector, decoherer, relays, sounder, tuning transformer, and tape recorder are shown on the large board. At the right is shown a contact type detector with telephone receivers. In this contact detector, steel balls floating on mercury were brought into contact with a strip of aluminum or oxidized iron. The contact pressure was varied by screwing a thumb screw in or out of the mercury. The phones used were the adjustable-magnets, watch-case type of Stromberg-Carlson phones, rewound with fine wire (36 or 40 B&S). Note the leveling screws on the coherer receiver board; not only were these necessary but the coherers had to be very carefully made, exhausted by a mercury pump and the circuits screened by a metal case as we screen circuits now. Taken in Denver, March, 1902

not located where there was a demand for the kind of service they could render. One of the main things they demonstrated was that wireless stations should be placed where there was a demand for what they could do, if wireless was to develop as an art. Also those three companies produced the first prominent wireless interference object lesson, when they intentionally and unintentionally interfered with each other in their efforts to each beat the other at reporting the yacht races.

About the time of these races, rumors started in the American Wireless Telephone and Telegraph Company that those who were working for the American Company would get opportunities to become chief engineers of subsidiary companies. According to the story, the promoters of the American Company had formed that company as a parent company and had parcelled out the United States and its possessions to a number of subsidiary organizations. The understanding was that the parent company was to furnish patent protection and instruments for considerations, and trained men for the subsidiary groups to hire as chief engineers.

By the subsidiary arrangement, the Pacific Wireless Telephone and Telegraph Company and the Continental Wireless Telephone and Telegraph Company had the Western States, Pacific States, and Alaska. Practically, they were one company because the two companies had the same men for officers. They seemed to me to have a territory where wireless might be immediately useful. After a few weeks of talks, telegrams, and letters while I was supervising the building of a station at Barnegat, New Jersey, I joined to the Pacific and Continental Wireless Telephone and Telegraph Companies and went to their headquarters in Denver.

The parent company had not lived up to its agreement to supply instruments, and from what I had seen of the officers of the parent company I did not believe they would ever supply the apparatus, so I set out to build two sets of instruments for use between Catalina Island, California, and the mainland of California. Some of the officers of the Pacific and Continental companies wanted to put the stations at Denver and Golden, Colorado, where they would have been, simply, another

case of experimental or demonstration stations and moreover they would have been in competition with both wire telegraph and wire telephone. I believe those officers never did agree to the California plan, however, as the

BIRD'S EYE SKETCH OF CATALINA AND THE ADJACENT MAINLAND OF CALIFORNIA

saying is now "We got away with" the California plan.

Work on the wireless instruments was started in November, 1901, in a little Denver shop belonging to Messrs. Carstarphen and Wallace. By the first of the year 1902, Mr. W. P. Carstarphen had interested capital, moved to a larger place, and changed the name to the Carstarphen Electric Co. I furnished the designs and supervision and the employees of those companies built the apparatus.

WHAT APPARATUS WE HAD

THE induction coil, vibrating interrupters, and the coherer detectors used in wireless sets in those days were not so bad for demonstration purposes, but they were obviously unreliable for giving public telegraph service. The vibrators would stick and stop. The coherers wouldn't work when they should, and would work overtime when they shouldn't, and the tape recorder made the same dots for static that it made for signals. So I designed an interrupter consisting of a motor driven disc with two insulating segments and two brushes pressing against it. That interrupter was effective and more reliable. We built coherer receivers, but in the meantime I built and tried out numerous contact point detectors with telephone receivers for sound reception. In those receivers static did not make the same sound that signals made. I bought watch case receivers like the "Hello girls" wore, rewound them with fine wire and mounted two on one head band like head sets of to-day.

I hired one of Mr. Carstarphen's men, Mr. G. T. Swenson, as an assistant and in April, 1902, we took the completed instruments to California and started construction of a station above Avalon on the Island and another at White's Point on the mainland near San Pedro and about twenty-five miles from Avalon. White's Point was the nearest point and located there was a dance pavilion which we made into a station. At Avalon we had to blast off part of the hill and build a station house.

THE FIRST STATION

A REAL, practical and continuous demand existed for telegraphic communication between Avalon, Santa Catalina Island, and the mainland of California. The demand for a service that would be more suitable than carrier pigeons and two or three daily boats had existed for some time and the needs for such service were growing. Not only was the demand there but the interfering static was more pacific on that coast than on the Atlantic Coast of the United States, and the distance was short enough for day-and-night, all-the-year wireless service. In addition to those

helpful conditions, the wireless apparatus we installed was simple. That apparatus did not contain the erratic coherer or induction coil vibrator and any part or material in it could be bought in the open markets of the United States and repairs could be made by almost any studious electrician. Those are probably the main reasons why wireless became a successful everyday public service between Catalina and the mainland.

Wireless operators did not exist in those days. There were plenty who could receive the signals made by a wire telegraph sounder or read the tape marks as produced with the coherer type of wireless receiver, but they had not learned to recognize the same dots and dashes in the form of short and long buzzes in telephone receivers. The first few messages were sent and received by Mr. Swenson and me although neither of us were operators. To send, we picked the letters out of a printed American Morse code, and to receive we made a mark with a pencil when we heard a short buzz and other marks or left spaces in proportion to the length of buzzes and spaces and when the sending stopped we compared those marks to a copy of the Morse code and wrote the corresponding letters above the combinations of dots and dashes. Many of the subsequent messages were received in almost that painfully slow way until real operators retrained their minds to give the same translation to buzzes that they had been giving to sounder clicks. After a few operators had set the example, others lost the it-can't-be-done feeling, and learned to receive rapidly.

The transmitter dynamo was driven by a gasoline engine having a spark ignition system and those sparks interfered with receiving. Sometimes, the gas engine had to be stopped to receive. Shutting down to receive and starting up the temperamental gas engine to transmit, combined with detector adjusting and undeveloped receiving ability made the early service very slow as compared to a good wire line.

AN HISTORIC RADIO GROUP

R. H. Marriott driving the first nail in the first wireless station at Avalon, Santa Catalina Island, May 12th, 1902. This was the first regular everyday wireless service station in the United States

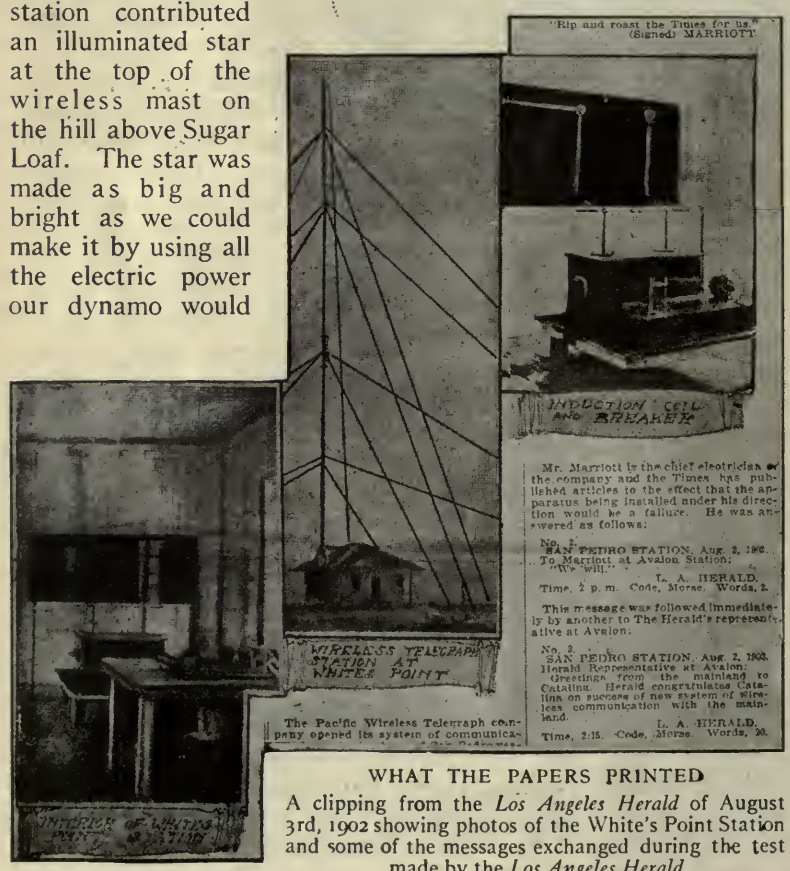
WHEN THE TROUBLE STARTED

THE majority of the public that paid any attention to our efforts during the building and testing of the stations, seemed to be divided in its opinions of wireless experts. They seemed to think the wireless experts were supernatural, crazy, or crooked. These three classes of opinions manifested themselves in ways which were sometimes amusing and sometimes painful to the expert. Where the opinion overrated us, it sometimes caused some embarrassment. For example, while we were developing the sound receiving method, a number of sensitive microphones had been made and the Avalon station had been provided with concrete piers anchored in rock, and a sound proof booth, for delicate microphonic work. Before the station was completed, a visitor asked some question about a carbon-steel microphone that was resting on a piece of paper on a pier and while the microphone was being explained and demonstrated, the visitor wore the telephone receivers attached to it and a fly lit on the paper and walked. The visitor saw and heard the fly light and heard his foot steps in the telephone receiver. The visitor was startled and amazed almost to the point of dragging the microphone off of the pier. And I was equally startled and amazed the next day when I read of myself as a scientific wizard of infinite ability occupied on the hill above Avalon with instruments so sensitive that I could hear flies walk in San Pedro. As the distance was twenty five miles, that was an excellent yarn for those

days although it could be done with radiophones and receivers of to-day.

At Catalina was a resident who had known and admired my grandfather. He had admired my grandfather so much that he did not want to see the family name dragged in the mire by me. From his remarks I gathered that he with others were convinced that wireless was all a fake and he was very much afraid that my notably honest and wise grandfather had failed to leave one or both of those notable characteristics to this grandson. He was sincere even to the extent of intimating he would pay my fare out of the country if I was as weak in my finances as I appeared to be weak in honesty or wisdom.

The 1902 Fourth of July fireworks at Avalon were novel in that they included the burning of a steamship. The old S. S. *Hermosa* which had served Avalon for years, with transportation and communication, was set on fire and towed around and back and forth in the outer harbor while the band played and rockets ascended from the top of Sugar Loaf Rock, and the wireless station contributed an illuminated star at the top of the wireless mast on the hill above Sugar Loaf. The star was made as big and bright as we could make it by using all the electric power our dynamo would deliver. That noticeable brilliancy on our part had an unexpected effect.


"Rip and roast the Times for us."
(Signed) MARRIOTT

INDUCTION COIL AND BREAKER

Mr. Marriott is the chief electrician of the company and the Times has published articles to the effect that the apparatus being installed under his direction would be a failure. He was answered as follows:

No. 2.
SAN PEDRO STATION, Aug. 2, 1902.
To Marriott at Avalon Station:
"We will."
L. A. HERALD.
Time, 2 p. m. Code, Morse. Words, 2.

This message was followed immediately by another to The Herald's representative at Avalon:

No. 3.
SAN PEDRO STATION, Aug. 2, 1902.
Herald Representative at Avalon:
Greetings from the mainland to Catalina. Herald congratulates Catalina on success of new system of wireless communication with the mainland.
L. A. HERALD.
Time, 2:15. Code, Morse. Words, 20.

WIRELESS TELEGRAPH STATION AT WHITE'S POINT

The Pacific Wireless Telegraph company opened its system of communica-

INTERIOR OF WHITE'S POINT STATION

WHAT THE PAPERS PRINTED

A clipping from the *Los Angeles Herald* of August 3rd, 1902 showing photos of the White's Point Station and some of the messages exchanged during the test made by the *Los Angeles Herald*

THE FIRST PACIFIC COAST MESSAGE

ON JULY ninth I received the first message at Avalon and all it said was "Do you get me." It was answered in the affirmative, but the answer was not received. Mr. Swenson on the mainland had started sending signals to me on June 28th; however, in trying out the various receivers I had not tried to translate what he said, if he did say anything, until I picked the kind of detector that seemed to be the most serviceable. That detector proved to be a contact between a polished steel tip and an oxidized iron plate. The first plate I made was from a hack saw blade, but I found I could do better by burning the surface off a piece of tin can using a blow torch and a little water and then a little oil on the oxidized surface. To get fine adjustment I needed a well made steady screw with fine threads and a large dial. The spherometers I had used in college to measure the curvature of lenses were the first thing I thought of, so I went to Los Angeles and bought some and Mr. Swenson made them into detectors that were used for several years.

Adjustments at the two stations followed and the exchanging of test messages began. The statement that test messages were being exchanged brought forth a chorus from "Doubting Thomas." A few days later Jeffries and Fitzsimmons fought in San Francisco and as we wanted early returns and wanted to convince doubters, we arranged to wireless the returns across to Avalon.

"EARS THEY HAVE AND HEAR NOT"

THE fight returns were laboriously received by me on the hill above Avalon about midnight and written out and taken down to town and posted. Those who were up read the

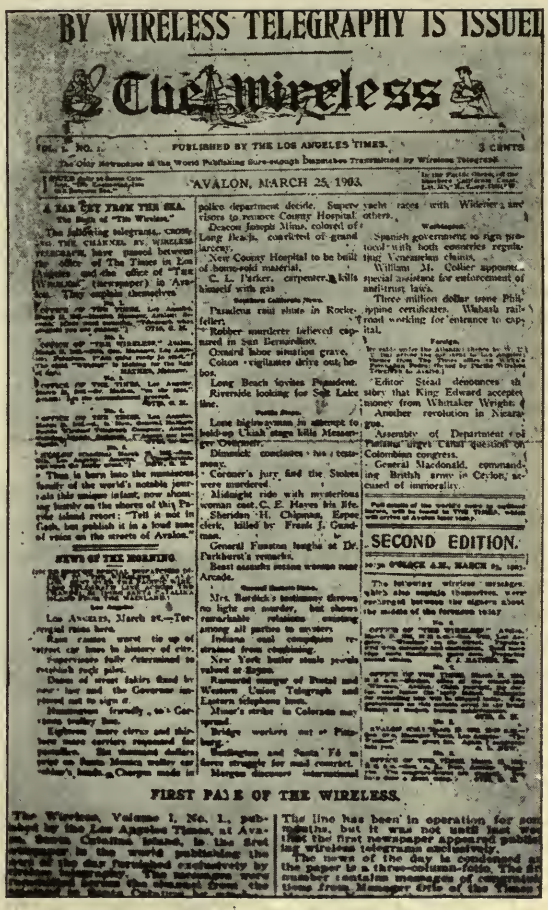
bulletin but did not seem to be inclined to pay any bets on the strength of what it said. However, I was happy because I knew the papers would verify my report next day. But I had not studied psychology sufficiently for that situation. The verification by the newspapers resulted in a large collection of stories as to how the news had been received, in every way but by wireless. The knocking was epidemic, for nearly everybody broke out with verbal hammers. Carrier pigeons were credited with the feat, a man was said to have been seen bringing me the message in a small boat, good guessing and advance information were discoursed upon and then somebody bobbed up with the story that the ex-Fourth of July star illumination had been used on the mainland station mast and somebody had seen the flashing light. That yarn about the star was damnable.

The gossip and atmosphere of disbelief in the wireless was enough. However it had not stopped at that but was reflected somewhat in the more durable black and white of the newspapers. Catalina was advertized as a place where one could get scenery, climate, fish, and goats. I enjoyed the scenery, climate, fish, and hospitality of the Banning brothers who owned the Island, but lost my goat to the doubting public and similar newspapers. The *Los Angeles Times* was one of my goat getters.

"AND EYES, BUT SEE NOT"

THE *Los Angeles Herald* had been friendly and was asked to send men to both stations and exchange messages and tell the public what it found. On August second when the *Herald* notified me at Avalon that they were on the job at the mainland stations, I was tired and sore from the effects of oral and newspaper gossip so my message to the *Herald* was "Rip and Roast the *Times* for us." The *Herald* replied "We Will" and patiently sent and received messages over the comparatively slow system and wrote up their work and published it, including my message.

A daughter of a wealthy man was taken sick at Avalon and her mother obtained a specialist from Los Angeles by using the wireless. Those successive demonstrations helped to get more people to believe wireless could give service, but the thing that removed all doubts from everybody's mind was as funny as it was thorough. Two colored men got into the Metropole Hotel Bar on the Island and collected some change, a case of champagne and



BY WIRELESS TELEGRAPHY IS ISSUED

The Wireless

PUBLISHED BY THE LOS ANGELES TIMES.

AVALON, MARCH 25, 1903.

SECOND EDITION.

FIRST PAGE OF THE WIRELESS.

HOW THE NEWS GOT FROM THEM TO US

First page of *The Wireless* Vol. I No. 1. A little newspaper started by the *Los Angeles Times*, March 23, 1903. It was made up from wireless dispatches received from the California mainland

some miscellaneous drinkables and departed from Avalon with the loot on the five A. M. boat. Such a get-away was old and had been safe for years because there had been no means of communication and the next boat did not go until eleven A. M. But the Bar folks knew the wireless would work and they sent a wireless message to the mainland which caused the colored men to be very surprisingly and very officially received at the pier in San Pedro. It was a spirited wireless comedy for everybody but the Negroes and it caused a laugh which shook almost all remaining stubborn disbelief out of the public.

SO WIRELESS BEGAN FOR US IN 1902

THAT business of putting wireless into common everyday service in the United States occurred in 1902 or ten years after Sir William

Crookes had said "Here, then, is revealed the bewildering possibility of telegraph without wires, posts, cables, or any of our present costly appliances." (*Fortnightly Review*, London: February, 1892.) He said those words while discussing the wireless experiments which Hertz had performed in 1886.

After the stations proved themselves, the newspaper reporters and others said they had not intended to belittle wireless and wireless apparatus or wireless engineers, but that they may have unconsciously done so in attacking the stock jobbers who were exaggerating what wireless could do so they might draw big commissions from the sale of doubtful stock.

Several wireless companies were selling stock and had been selling stock by saying or implying that they were about to span the oceans and continents and take all the business away from the telephone, telegraph, and cable companies. Stock salesmen were not telling the truth when they said the wireless of those days could render everyday service across the Atlantic or Pacific or could compete with wire lines. Antidote statements were a natural result, but they were equally untruthful when they had said that the wireless we had was not capable of giving everyday useful service across that twenty-five miles of ocean where there was no cable to compete with.

After a few months of everyday wireless service, the *Los Angeles Times* started a little paper called "*The Wireless*" at Avalon. The contents of that paper consisted of local news and world news as received via wireless.

HOW THE AVALON CIRCUIT PROGRESSED

SINCE that time, several different organizations have owned and operated and improved that wireless circuit from the mainland to the Island. During those years the island station was shifted about Avalon and the mainland station was shifted about San Pedro, Los Angeles, and Long Beach. The list of owners included the Pacific Wireless Telephone and Telegraph Company, the United Wireless Telegraph Company, the Marconi Wireless Telegraph Company of America, the U. S. Navy, and the Pacific Telephone and Telegraph Company.

The Pacific Telephone and Telegraph Company in late years (1920) made that radio circuit one which could be used for either telephoning or telegraphing and they connected the mainland radio station through repeaters to the whole Bell Telephone System of the United States and they built a local Bell system on the island to serve as an inlet and outlet for the Catalina radio station. Avalon citizens were able to talk by wire to the Catalina radio station and thence by wireless to the mainland and thence by wire to Los Angeles, San Francisco, Chicago or New York. And for the purposes of further demonstration, Deal Beach on the New Jersey shore and the S. S. *Gloucester* on the Atlantic were equipped with radio phones and conversations were carried on via wire and wireless between Avalon and the *Gloucester*.

After the telephone service became a matter of course, many of the Telephone Company's customers talked fluently and freely, not realizing that they were operating a radio telephone circuit between Catalina and the mainland, and a growing number of radio operators, amateurs, and broadcast listeners tuned-in to pick up what was said over that radio telephone circuit. Some of those who used that radio telephone circuit were movie actors and people with no work to do, but with time, money, and energy to spend, therefore it is not difficult to imagine their conversations as possessing sufficiently interesting possibilities to tune-in for. To provide secrecy, the telephone company tried experiments at making the radio waves such that only their receivers were capable of changing the scrambled radio waves into intelligible speech. By this method, the telephone company might have kept the speech unintelligible to all but experts and ingenious amateurs, but there were other interfering factors. When the original radio circuit started in 1902 there were no other radio receivers or transmitters to interfere with it. As time went on, radio service circuits multiplied and produced interference, from transmitters and regenerative receivers.

"THE BOY GREW OLDER"

THE wireless service family had grown in twenty-one years to include service between land stations, ship stations, ships and shore, submarines, airships, aeroplanes and amateur stations and service from compass stations, fog beacon stations and broadcasting stations and besides that, the radio frequencies

and radio apparatus that had been developed for radio service had also been applied for communication over telephone, telegraph, and high and low voltage power lines. From serving dozens it had grown to serve millions.

The telephone company could not entirely avoid all of the interference even though they did carefully choose the sites for their stations and use loops, wave-traps and other selective devices. Such interferences to the wireless telegraph circuits had only been a handicap and irritation for the wireless company's operators, but in the radio telephone it handicapped and irritated the customers. And last of all and probably greatest of all, the wavelengths used by the telephone company were wanted for radio broadcasting.

That first wireless service circuit lived and served the public for twenty-one years. But the wireless circuit family had grown so large there is no longer any room for that first circuit. The Pacific Telephone and Telegraph Company substituted two cables for it when their radio station licenses expired on August 1, 1923, and quit using the wireless. The argument for doing this was that the cables provide more secrecy, no interference, and connect up better with the wire system and business system of the Pacific Telephone and Telegraph Company.